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### Hair Extension

This invention relates to a method of joining a hairpiece to a lock of hair to provide a hair extension, to a hairpiece for use in such a method, to a tool for use in such a method, and to an associated kit.

5 In this specification, the phrase 'lock of hair' is used to mean one or more strands of hair; the term 'hairpiece' is used broadly to include any natural or synthetic strand or strands that may be attached adjacent the end of a person's natural hair to provide a hair extension. The hairpiece may comprise straight, curled, braided or unbraided fibres. References to an adhesive being curable by  
10 exposure to electromagnetic radiation, and references to UV curable radiation are used to mean that the adhesive is caused to change from a tacky liquid or semi-liquid bondable state in which it may temporarily bond to a surface, to a cured state in which the adhesive effectively bonds permanently (save for intended removal). In this context 'curing' is intended to mean initiation of a  
15 series of steps that result in full curing of the adhesive as well as effecting full curing directly.

### Background

It is already known to add loose hair extensions by gluing individual sections of hair (human or synthetic) into a person's own. However, this process  
20 requires experience with hair extensions and a certain degree of skill to obtain satisfactory results. The whole process is lengthy and generally quite expensive when done by a professional in a salon.

Incorrect application of an adhesive can stick to the wrong sections of hair or worse burn parts of the scalp resulting in dissatisfaction and pain.

Furthermore, the current methods used for extensions require an adhesive that is typically very difficult to remove and the whole process can lead to significant damage to a person's own hair.

5 The basic technique is to take a small section of loose hair, dip the end of the section into an adhesive, then roll this around a small section of the person's own hair at the root until the adhesive cures. This requires considerable skill and dexterity.

10 Adhesives consist of long chain polymers. These bond to the surface to be adhered and give rise to the required adhesion. Conventional adhesive materials bond by a thermal processes such as hot air, infrared IR or near infrared (NIR). The coated material is heated using a considerable amount of energy; the mass heats up, allowing solvents and water to evaporate. Various conventional adhesives are currently used for hair extensions, along with other bonding methods such as 'hot-melt', a heated plastic that cools to create a  
15 cohesive seal. All of these adhesives are difficult to apply, remove and have the high possibility of causing damage to the hair and pain to the user.

Examples of thermal processes which require the application of heat are described in US Patent 6,510,856, European Patent 876773, European Patent 0650672B and US 6247236. An alternative approach is suggested in US Patent  
20 6405736 which describes a removable self adhesive hair extension in which the hair fibres are secured to a self adhesive strip which is removably applied to the scalp or the back of the head of the user.

Our research has shown that there is a need for a method of applying hair extensions which may easily be applied in the home without requiring

professional help at the salon and which provide pleasing results without the use of significantly elevated temperatures.

Accordingly, in one aspect, this invention provides a method of joining a hairpiece to a lock of hair to provide a hair extension, which method comprises bonding said hairpiece to said lock using an adhesive that is curable by exposure to electromagnetic radiation.

The illustrated examples make use of bonding processes which do not require the external application of significant amounts of heat, and so the processes are essentially non-thermal. The adhesives used in the embodiments of this invention achieve bonding through use of electromagnetic energy.

Although the adhesive may be applied to the lock and/or the hairpiece at the point of use, it is preferred for the adhesive to be precoated or otherwise pre-applied to a bonding region adjacent an end of said hairpiece.

It is preferred for the adhesive to be a UV curable adhesive. It is already known to use UV adhesives for bonding and filling processes such as, for example, for filling teeth in dentistry and for attaching false or replacement nails in cosmetic applications. Such adhesives are available in the form of acrylics or gels and may be used, suitably modified if necessary, in the present invention.

UV and electromagnetic curing is a process by which monomers undergo curing (i.e. polymerisation or cross-linking) upon exposure to the radiation. This is a 'cold' photochemical reaction in which molecules known as 'photo-initiators' absorb the high energy electromagnetic rays and breakdown to various components which in turn activate reactive molecules in the adhesive agent. In this way, the electromagnetic energy creates a strong 3-dimensional network of

polymers as it cures. A further advantage arising from the use of electromagnetically curable adhesives is that, compared to adhesives which require evaporation of water and solvents, curing occurs throughout the substance and occurs at a much faster rate which means that an effective bond can be achieved in a much shorter period. This means that the hair extensions may be applied without professional help.

Whilst the method may be carried out in any suitable manner, in a particularly preferred embodiment, the method includes applying a tool to clamp the lock of hair and the hairpiece, the tool also having a source of electromagnetic radiation therein operable to irradiate said adhesive. The tool also may perform the function of isolating the lock of hair to be extended, so that the extension does not bond inadvertently to other locks.

The invention also extends to a tool for use in the above method, the tool comprising first and second members movable in respect to each other between an open position and a clamping position in which, in use, they may clamp in abutting or overlapping relationship an end region of the hairpiece and an end region of said lock of hair, said tool further including a source of electromagnetic radiation operable in the use to irradiate the abutting or overlapping regions to effect curing of an adhesive located in said abutting region.

The tool may take many forms but in one embodiment the first and second members are pivoted together at one end to form a hingeable jaw in which the lock of hair and the hairpiece may be clamped in abutting or overlapping relationship.

Preferably, said tool includes switch means for switching on said source

of electromagnetic radiation, said switch means may advantageously be disposed so as to switch on when said first and second members are moved to or towards the clamping position.

The invention also extends to a hairpiece having provided in a bonding region thereon an adhesive curable by electromagnetic radiation.

The invention also extends to a hair extension kit comprising one or more hairpieces and a tool each as described above.

Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

The invention may be formed in various ways, and an embodiment thereof will now be described in detail reference being made to the accompanying drawings in which:-

Figure 1 is a general perspective view of a hair extension clamp tool in accordance with this invention;

Figure 2 is a detailed view on the end of the hair extension clamp tool of Figure 1, and

Figure 3 is a schematic sectional view through the hair extension clamp tool of Figures 1 and 2.

#### Example 1

A braid 4 made of synthetic hair was coated at one end 6 with a curable UV adhesive to provide a pre-glued braid ending. Referring to the Figures, a hair extension clamp tool 10 comprises first and second jaw members pivoted together at a hinge region 16 for movement between the relatively open position

shown in Figure 1 and the clamped positions shown in Figures 2 and 3. In the open position of Figure 1 the braid 4 may be slotted through the hinge region but, when the jaws are clamped together the hinge clamps the braid against longitudinal movement. The jaw members 12, 14 are normally urged towards the open position shown in Figure 1 by means of a spring bias (not shown). The jaw members 12, 14 may be formed with a groove partially to receive the braid and a lock of hair. One of the jaw members 12 has an electromagnetic radiation source 18, here a UV light source in the form of a LED which receives power from a power supply (not shown). The power supply is switched by means of a microswitch 20 which closes the circuit turning the LED on, when the jaws are closed to the clamping position.

In use, the user positions a pre-glued braid 4 in the tool 10 in the position shown in Figure 1, with the pre-glued region 6 positioned towards the front of the jaws. The user then selects a lock of hair 22 from their head which they wish to extend. The lock 22 is typically of approximately the same diameter as that of the braid, and is fed into the open end of the jaws to the position shown in Figure 1, where it overlaps the pre-glued braid ending 6. The pre-glued portion is preferably tacky so that it forms an initial tacky bond with the hair. The user then closes the jaws 12, 14 to clamp the hair to the braid and to apply pressure thereon, with the closure of the jaws causing the LED 18 to direct radiation towards the pre-glued braid ending. This initiates curing of the adhesive thus bonding the braid to the lock of hair.

In a preferred embodiment, the adhesive reacts to electromagnetic radiation in the UV spectrum provided by a UV source such as a UV frequency-



specific LED or lamp. However, it will be appreciated that different chemical compositions may require electromagnetic radiation outside the UV spectrum, and the method is not limited to UV-curable adhesives.

5 In the above embodiment, the adhesive is pre-coated onto the extension or braid that is to be added, and only becomes reactive on application of electromagnetic energy of a particular threshold of intensity. This intensity can vary depending on the exact nature of the chemical composition of a particular adhesive although it is preferred for the threshold to be substantially higher than standard daylight to avoid inadvertent activation thereof. It should be noted that  
10 the adhesive does not need to be pre-coated and could be applied directly to the site to be bonded, at the time of application.

Although in the above embodiment the UV source is activated automatically when the jaws of the clamp are brought together in the closed position, in other instances the UV source could be controlled manually, by a  
15 separate switch or button.

In the above embodiment a single LED is shown which points directly at the region of overlap between the pre-glued braid ending and the end of the user's hair. In other arrangements, where the hair extension is complex or overly large, the UV light may be differently angled and/or provided by two or  
20 more LEDs. For example, for a larger braid, light may be directed radially to the bundle. In addition, the UV source could be separate, or separable from the clamp member to allow adjustment of the angle of irradiation.